

REMARKS

Claims 1-17 are pending in this application, with claims 1 and 10 being independent. Applicants propose to amend claims 1 and 10 . No new matter would be added by the proposed amendments. In particular, support for amended claims 1 and 10 (a diaphragm carrier having a circular perimeter and a countersunk portion) is found in the application, e.g., at page 4, line 29, to page 5, line 2. In addition, all amendments set forth above would raise no new issues that would require further consideration and/or search. Applicants submit that these amendments would place the claims into condition for allowance, or at least present the rejected claims in better form for consideration on appeal, and should therefore be entered after the final rejection under 37 C.F.R. § 1.116.

35 U.S.C. § 103

Claims 1 - 17 have been rejected as allegedly obvious over U.S. Patent No. 6,425,671 ("Adler"). Applicant requests withdrawal of this rejection and allowance of the claims because Adler does not disclose or render obvious the subject matter of amended independent claim 1 or 10.

Amended claim 1 recites a deformable mirror including a reflecting surface disposed on a diaphragm and a diaphragm carrier that supports the diaphragm. The diaphragm carrier has a circular perimeter and a countersunk portion that defines a non-circular, pressurizable rear surface of the diaphragm. The rear surface is an approximately rectangular surface, an approximately oval surface, or an approximately elliptical surface.

Amended claim 10 recites a method of reflecting a laser beam including directing the laser beam onto a deformable, reflecting surface that is supported by a pressurizable diaphragm and altering a pressure within a diaphragm carrier. The diaphragm carrier has a circular perimeter and a countersunk portion that defines a non-circular pressurizable, rear surface of the diaphragm, where the rear surface is an approximately rectangular surface, an approximately oval surface, or an approximately elliptical surface.

Adler relates to a flexible mirror structure and assembly. See Abstract. A puller is attached to a rear surface of the mirror and can be tensioned to deform the mirror. See col. 1:53 – col. 2:35. As shown in FIG. 4, the puller is symmetric about a central axis, such that when tension is applied to the mirror with the puller, the mirror is deformed into a shape that is symmetric about a central axis. In particular, Adler states, “[t]he present inventors have discovered new methods of flexing spherical mirrors to achieve highly accurate axisymmetric shapes such as paraboloids. These methods involve one or more of the following: a. Pulling on a large diameter circular area of the mirror back. . . .” Col. 1:23-29 (emphasis added).

In contrast, claim 1 requires that a countersunk portion of a diaphragm carrier defines a non-circular, pressurizable rear surface of the diaphragm, where the rear surface is an approximately rectangular surface, an approximately oval surface, or an approximately elliptical surface. Similarly, claim 10 requires altering a pressure within a diaphragm carrier that supports the diaphragm to deform the reflecting surface. A countersunk portion of the diaphragm carrier defines a non-circular pressurizable, rear surface of the diaphragm, wherein the rear surface is an approximately rectangular surface, an approximately oval surface, or an approximately elliptical surface.

Because the shape of the rear surface of the diaphragm that applies pressure to the mirror is non-spherical (e.g., rectangular, oval, or elliptical), the mirror is deformed by different amounts in perpendicular directions (i.e., along and perpendicular to the long axis of the rectangle, oval, or ellipse), such that the mirror has different focal lengths along the perpendicular directions. As explained in the application, a mirror that can be deformed in a non-spherical shape is particularly useful when the mirror is used to deflect a beam through a relatively large angle because such a mirror does not introduce substantial astigmatism in the reflected beam. See page 4, lines 24 - 28; page 5, lines 15 - 18; page 5, lines 26 - 28. In contrast, mirrors whose reflecting surface is deformed in a symmetric fashion, when used to reflect a beam through a large angle require an additional reflecting surface to correct the astigmatism introduced by the circular mirror. See page 2, lines 1 - 6 and FIG. 5.

The Office concedes that Adler does not disclose a diaphragm carrier that defines a non-circular, pressurizable rear surface of a diaphragm, where the rear surface is an approximately rectangular surface, an approximately oval surface, or an approximately elliptical surface. However, the Office, citing In re Dailey, 357 F.2d 669 (CCPA 1966), asserts that a change in shape from the symmetric circular shape disclosed in Adler to the claimed shape would have been obvious.

Applicant respectfully submits that a prima facie case of obviousness has not been established and that the holding of Dailey is distinguishable from, and inapplicable to, the patentability of claims 1 and 10.

Claims 1 and 10 require that the rear surface of the diaphragm has an approximately rectangular, oval, or elliptical surface. Such shapes of the rear surface have a significant effect on the profile of a light beam reflected from the mirror. In contrast, the particular configuration of the invention for which a patent was sought in Dailey was not significant to the function of the invention.

In Dailey, the applicants sought a patent for a disposable plastic infant nursing container. One claim of the application recited that the container included top and bottom sections in a configuration of “a portion of a sphere less than a hemisphere.” Id. at 670. The board upheld the examiner’s rejection of this claim as unpatentable over a reference showing a container having top and bottom sections configured as connected hemispheres because the “the configuration of the container is a ‘mere matter of choice’ not significantly novel over [the cited reference].” Id. at 672 (emphasis added). The CCPA affirmed the board’s decision because the applicants “presented no argument that convinces us that the particular configuration of their container is significant or is anything more than one of numerous configurations a person of ordinary skill in the art would find obvious for providing mating surfaces in the collapsed container of [the cited reference].” Id. 672-73.

Here, in contrast, when the rear surface of the diaphragm is pressurized the approximately rectangular, elliptical, and oval shapes for the rear surface of the diaphragm provide configurations of the diaphragm that cause the mirror to be deformed into non-spherical

shapes that are not symmetric about a central axis of the mirror. Such shapes cause the deformed mirror surface to reflect a light beam at a high angle without introducing an astigmatism in the reflected beam. See, e.g., FIG. 5 of the application. If symmetrical mirrors were used to reflect the light beam through such angles, an undesirable astigmatism would be introduced into the reflected beam. However, the use of the mirror of claim 1 and the method of reflection of claim 10 prevent the introduction of such an astigmatism. Thus, the shape of the rear surfaces has a significant effect on the function of the mirror and the resulting beam reflected from the mirror, in contrast to the claimed features in Dailey.

In contrast, the mirror disclosed in Adler appears to be intended for use in telescopes (see col. 1:11-15), and in such an application light generally strikes a main mirror of the telescope along the axis of the mirror and then is reflected back along its input path. In such a configuration, a paraboloid mirror, as disclosed in Adler, is advantageous. A change in shape from the axially-symmetric shape disclosed in Adler would have been disadvantageous and would not have been obvious, because such a change of shape would have introduced an astigmatism in on-axis reflections for which Adler's mirror was intended.

Furthermore, Adler does not disclose or suggest a diaphragm carrier that has a circular perimeter as recited in claims 1 and countersunk portion to define the non-circular, pressurizable rear surface of the diaphragm. As described in the specification at page 5, lines 1-2, such a shape of the perimeter is advantageous because it allows the mirror to be easily flanged to a beam guidance and allows the desired shaped of the deformable mirror to be created by the countersinking in the diaphragm carrier.

Claims 1 and 10 are allowable at least these reasons, as are the claims that depend from claims 1 and 10.

* * *

Claims 6, 7, 14, and 15 have been rejected as allegedly obvious over Adler in view of U.S. Patent No. 5,020,894 ("Giesen"). Applicant requests withdrawal of this rejection and allowance of the claims because Giesen does not cure the deficiencies of Adler.

Applicant : Christian Boettcher
Serial No. : 10/722,362
Filed : November 26, 2003
Page : 9 of 9

Attorney's Docket No.: 15540-017001 / 25897;
Trumpf: 18.00246; DS07961

Giesen relates to a deformable mirror used to reflect a high power laser beam. However, Giesen does not disclose a diaphragm carrier having a circular perimeter and a countersunk portion of the diaphragm carrier that defines a non-circular, pressurizable rear surface of the diaphragm, where the rear surface is an approximately rectangular surface, an approximately oval surface, or an approximately elliptical surface.

For at least this reason, Giesen does not cure the defects of Adler with respect to claims 1 and 10, and claims 1 and 10 are allowable.

Because claims 6 and 7 depend from claim 1 and claims 14 and 15 depend from claim 10, applicant requests withdrawal of this rejection and allowance of the claims.

CONCLUSION

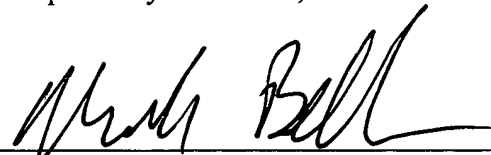
For the foregoing reasons, applicant requests allowance of all claims.

No fees are believed to be due at this time. Please apply any charges or credits to deposit account 06-1050, referencing Attorney Docket No. 15540-017001.

Respectfully submitted,

Date: _____

7/19/05



Mark R.W. Bellermann
Reg. No. 47,419

Fish & Richardson P.C.
1425 K Street, N.W. - 11th Floor
Washington, DC 20005-3500
Telephone: (202) 783-5070
Facsimile: (202) 783-2331
40291184.doc